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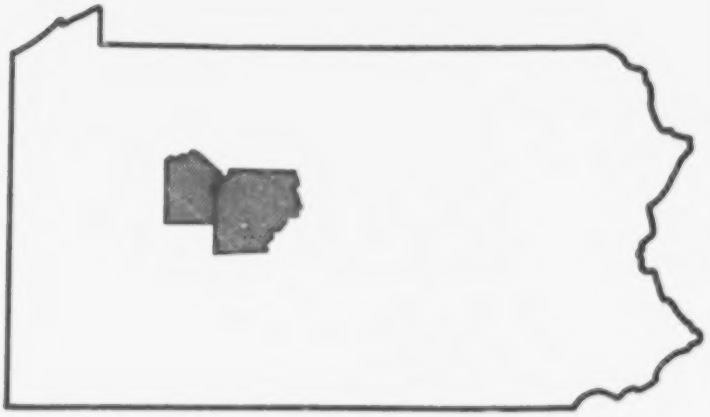
FLOOD INSURANCE STUDY

BOROUGH OF FALLS CREEK, PENNSYLVANIA
JEFFERSON AND CLEARFIELD COUNTIES



SEPTEMBER 6, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 420511

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: September 6, 1989

Flood Insurance Study Revised:

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	2
	2.3 Principal Flood Problems	4
	2.4 Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
	3.1 Hydrologic Analyses	4
	3.2 Hydraulic Analyses	5
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	7
	4.1 Floodplain Boundaries	7
	4.2 Floodways	7
5.0	INSURANCE APPLICATIONS	9
6.0	FLOOD INSURANCE RATE MAP	10
7.0	OTHER STUDIES	10
8.0	LOCATION OF DATA	11
9.0	BIBLIOGRAPHY AND REFERENCES	11

TABLE OF CONTENTS - continued

FIGURES

Page

Figure 1 - Vicinity Map 3

Figure 2 - Floodway Schematic 8

TABLES

Table 1 - Summary of Discharges 5

Table 2 - Regulatory Data 6

EXHIBITS

Exhibit 1 - Flood Profiles
Falls Creek Panel 01P

Exhibit 2 - Flood Insurance Rate Map and Street Index

Exhibit 3 - Elevation Reference Marks

FLOOD INSURANCE STUDY
BOROUGH OF FALLS CREEK, JEFFERSON AND CLEARFIELD COUNTIES, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Borough of Falls Creek, Jefferson and Clearfield Counties, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the Pittsburgh District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-86-E-2226, Project Order No. 2. This work was completed in September 1987.

1.3 Coordination

On May 30, 1985, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the Jefferson County Planning Commission, and the COE (the study contractor) to identify the streams to be studied by detailed methods. On September 28, 1988, a final CCO meeting was held with representatives of FEMA, the borough, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Borough of Falls Creek, Jefferson and Clearfield Counties, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

Falls Creek was studied by detailed methods for its entire length within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through September 1992.

An unnamed tributary to Sandy Lick Creek was studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Borough of Falls Creek.

2.2 Community Description

The Borough of Falls Creek is located in northeastern Jefferson County in west-central Pennsylvania, approximately 100 miles northeast of Pittsburgh. It is bordered by the Township of Sandy to the east and south, the Township of Winslow to the south, and the Township of Washington to the west and north. The Borough of Falls Creek has a total land area of 0.8 square mile. The 1980 population of the borough was 1,158, a 2 percent decrease from the 1970 population of 1,185 (Reference 1).

Falls Creek, with a total drainage area of 25.5 square miles at its mouth, joins Sandy Lick Creek on the right bank at creek mile 28.6 or approximately 1 mile downstream of DuBois. It flows in a southern direction from its source near Smithtown. The average bed slope of Falls Creek in the borough is 29 feet per mile. Local relief above the stream varies from a low of 1,400 feet to an average hilltop elevation of 1,500 feet within the study area. The valley floor varies from 300 to 500 feet in width.

The climate for this area is temperate with seasonal variation in temperature. The Borough of Falls Creek is geographically located in a region of both polar and tropical air mass activity, subjected to continental and maritime invasion. The weather is usually moderate but may have occasional rapid changes resulting from frontal air mass movements. Average monthly temperatures range from 23 degrees Fahrenheit ($^{\circ}$F) in January to 69°F in July. The average annual precipitation is approximately 45 inches.

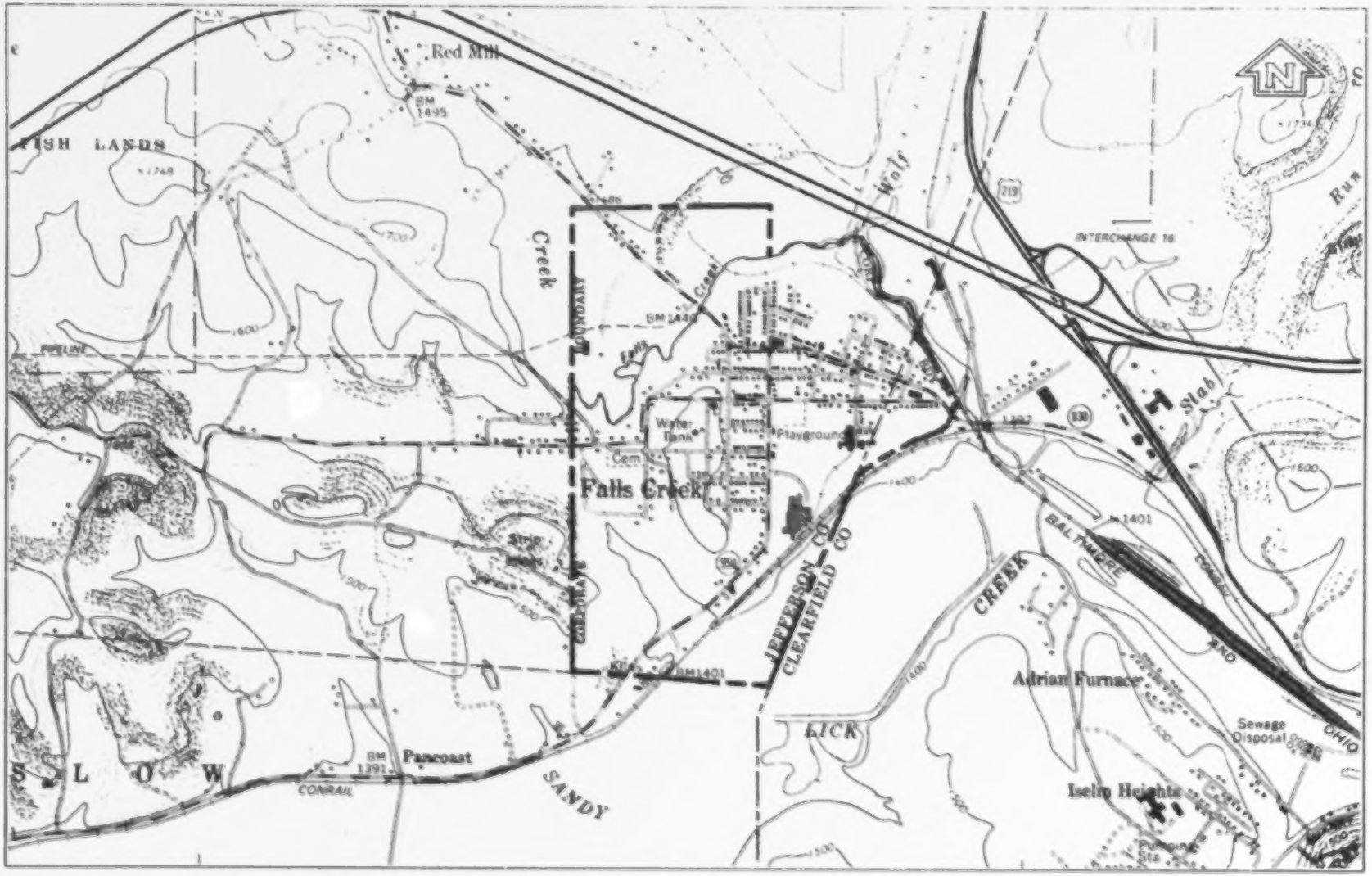


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF FALLS CREEK, PA

(JEFFERSON AND CLEARFIELD COS.)

APPROXIMATE SCALE

2000 0 2000 4000 6000 FEET

VICINITY MAP

2.3 Principal Flood Problems

Major floods may occur on Falls Creek at various times of the year; however, the main flood period is usually in the spring and summer months. Due to the basin size, shape, and steep slopes, the area is more susceptible to flash flooding from high intensity, short duration thunderstorms than the typical rain-snowmelt winter type storms.

2.4 Flood Protection Measures

There are no flood protection projects on Falls Creek that would affect flooding in the Borough of Falls Creek at this time, and there are no plans for such structures in the foreseeable future.

Kyle Dam, with a drainage area of 6 square miles, is located approximately 2 miles upstream of the Borough of Falls Creek corporate limits. The dam is owned and operated by the Pennsylvania Fish Commission (#PA00417) and is an uncontrolled earth filled structure primarily used for recreation. Although it is not a flood control or flood protection structure, it may provide minimal storage and some attenuation of floods.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

There are no stream gage or flow records for Falls Creek. The flow for the 100-year flood was developed using multiple regression formulae based on factors determined from a COE study of small streams in Pennsylvania (Reference 2). The factors used were drainage area, stream length, stream slope, and basin shape. A flow-drainage area relationship was then established for the Sandy Lick Creek basin using the Flood Insurance Studies for the City of DuBois and the Borough of Reynoldsville (References 3 and 4). The 100-year flow was determined from this relationship.

A summary of the drainage area-peak discharge relationships for the stream studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGE (cfs) 100-YEAR
FALLS CREEK		
At downstream corporate limits	25.0	3,060
At upstream corporate limits	12.8	2,340

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-sectional data for Falls Creek were obtained by field measurement. All bridges were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and the Flood Insurance Rate Map (Exhibit 2) where applicable.

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevation for Falls Creek was based at critical depth at the mouth. The results of the water-surface computations are tabulated for selected cross sections (Table 2).

Roughness coefficients (Manning's "n") used in the hydraulic computations for Falls Creek were chosen on the basis of photographs. The channel "n" value was 0.040, and the overbank "n" value was 0.080.

FLOODING SOURCE		STREAM CHANNEL			LEFT OVERBANK			RIGHT OVERBANK			100 YEAR FLOOD WATER SURFACE ELEVATION (NGVD)[2]
CROSS SECTION	DISTANCE[1] (FT.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	
A	6,530	50	1,240	3.0	248	998	1.1	290	141	0.5	1,407.1
B	8,300	40	1,830	11.6	34	550	5.5	0	0	0	1,424.9
C	9,110	76	2,267	4.9	0	0	0	71	113	1.1	1,430.8

1. Feet above confluence with Sandy Lick Run. 2. Feet

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BOROUGH OF FALLS CREEK, PA
(JEFFERSON AND CLEARFIELD COS.)

REGULATORY DATA

FALLS CREEK

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the stream studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 6).

For the stream studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for the Borough of Falls Creek (Reference 7).

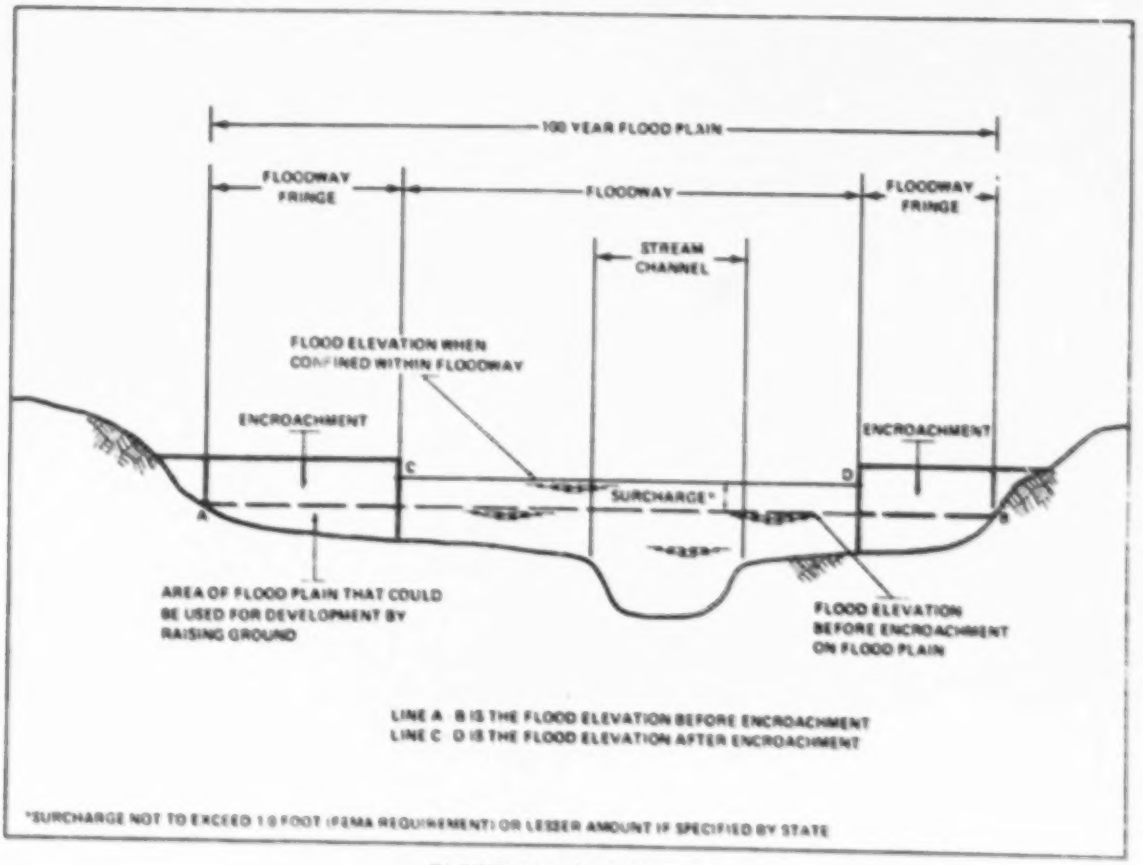
The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program,

a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain. The locations of selected cross sections used in the hydraulic analyses are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies for the Townships of Washington and Sandy are currently being prepared (References 8 and 9). The results of those studies will be in complete agreement with the results of this study.

Due to its more detailed nature, this study supersedes the Flood Hazard Boundary Map for the Borough of Falls Creek (Reference 7).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Pennsylvania, Washington, D. C., U. S. Government Printing Office, 1981.

2. U. S. Army Corps of Engineers, Pittsburgh District, "Untitled Regression Data," Pittsburgh, Pennsylvania, 1975.

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4. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Borough of Reynoldsville, Jefferson County, Pennsylvania, Washington, D. C., April 17, 1978.

5. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, November 1976, updated 1979.

6. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Falls Creek, Pennsylvania, 1966, Photorevised 1986.

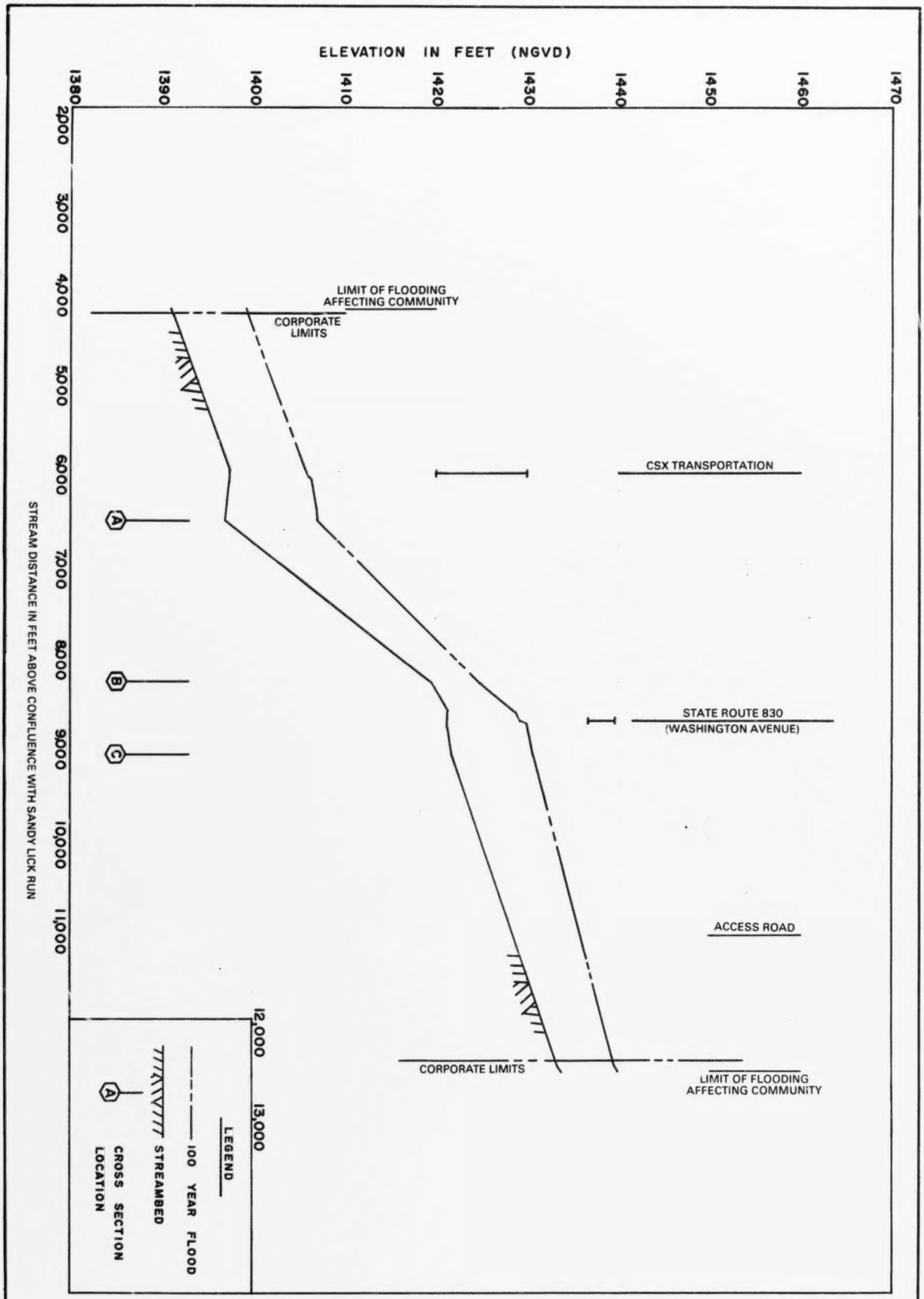
7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Borough of Falls Creek, Jefferson and Clearfield Counties, Pennsylvania, May 27, 1977.

8. Federal Emergency Management Agency, Flood Insurance Study, Township of Washington, Jefferson County, Pennsylvania (Unpublished).

9. Federal Emergency Management Agency, Flood Insurance Study, Township of Sandy, Clearfield County, Pennsylvania (Unpublished).

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (Feet NGVD)	Description of Location
RM 1	1,428.82	Chiseled square set on top of upstream right bank wing wall of CSX Transportation bridge over Falls Creek.
RM 2	1,440.49	Approximately 0.45 mile northwest along State Route 830 from Post Office at Borough of Falls Creek, Pennsylvania Department of Highways standard disk set on top center of upstream right bank wing wall of concrete bridge over Falls Creek.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY BOROUGH OF FALLS CREEK, PA (JEFFERSON - CLEARFIELD COUNTIES)	FLOOD PROFILES FALLS CREEK